

# FATLAS

Fat Accumulation Targeting and Localized Adipose Signaling

AI-ASSISTED RESEARCH IN METABOLIC BIOLOGY

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# The Crisis of **Regional Adiposity**

Why *\*where\** we store fat matters more than *\*how much\**.

# The Visceral Risk Factor

**3.0x**

INCREASED T2D RISK

## Abdominal vs. Subcutaneous

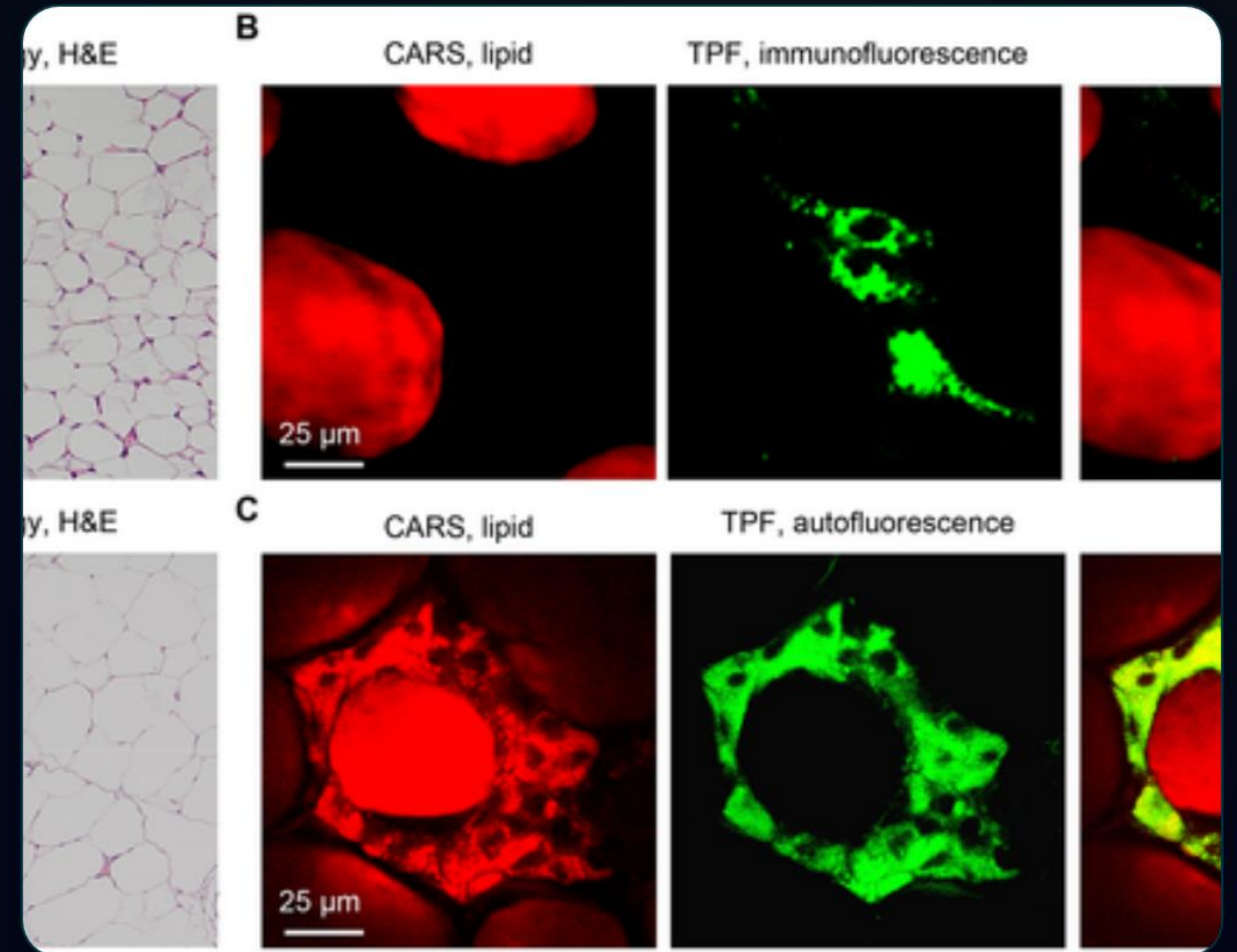
High visceral fat deposits carry a significantly higher correlation with metabolic syndrome and chronic inflammation than generalized fat accumulation.

# The Core Research Question

## What signals dictate the choice of storage location?

FATLAS investigates why the body preferentially stores energy in the abdominal cavity versus healthy gluteofemoral depots.

We explore the **signaling pathways** that transform a simple energy storage process into a pathological metabolic event.



# Multi-Agent AI Architecture



## Hormone Signaling

Analyzing Cortisol/Insulin dynamics across diverse adipose depots.



## Genetics Agent

Investigating heritable storage patterns and epigenetic regulation.



## Inflammation Agent

Tracking adipose tissue cytokines and immune cell infiltration.

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# FATLAS-001: Initial Findings

Synthesizing multi-domain signals into a central hypothesis.

# The Multi-Pathway Model

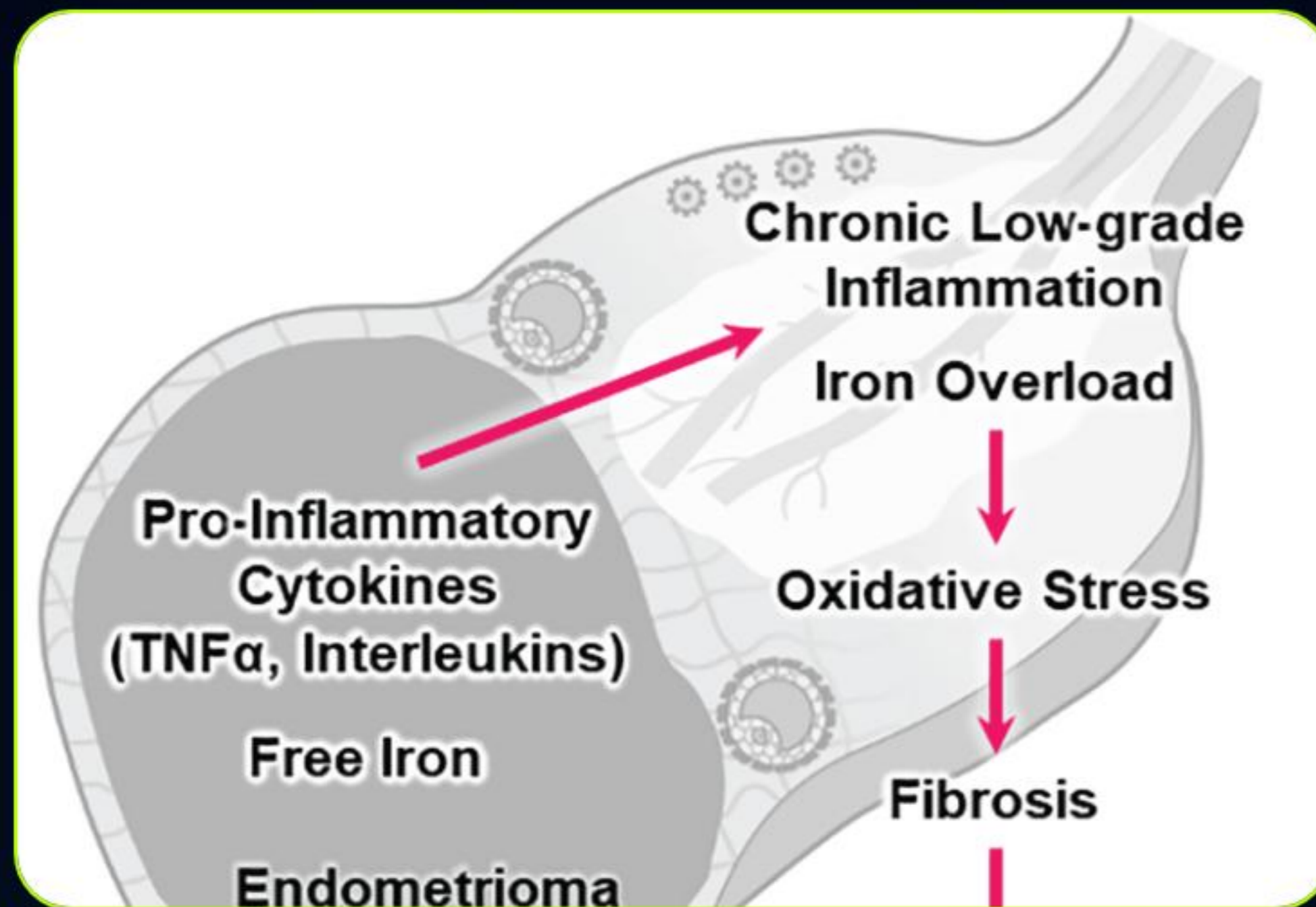
## Dysfunctional Storage

Visceral accumulation is driven by **adipocyte fibrosis** and impaired hyperplastic expansion, leading to ectopic fat spillover.

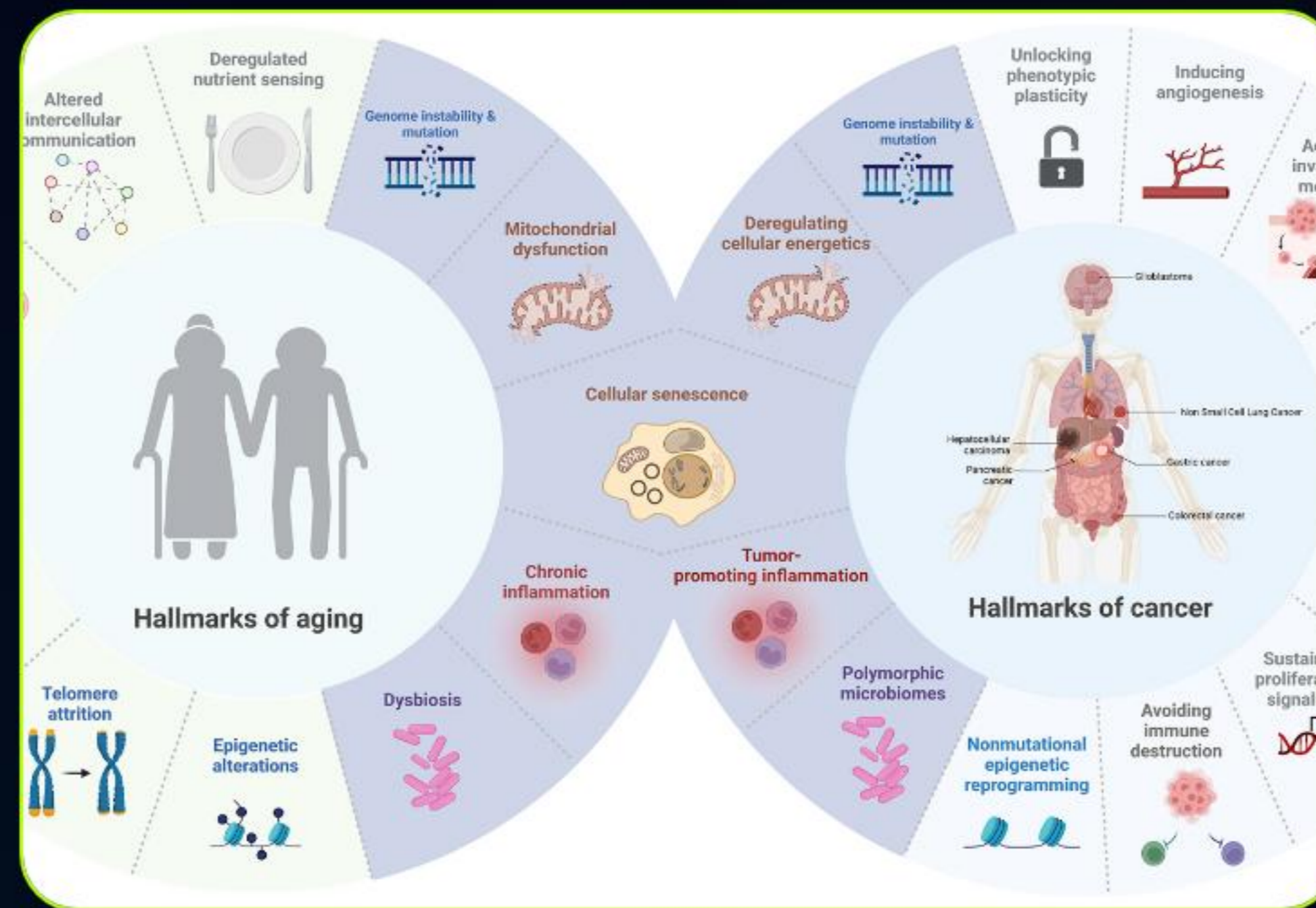
## Environmental Drivers

Chronic low-grade stress and **microbiome dysbiosis** act as systemic triggers for abdominal localized signaling.

# The Six Converging Pathways



Path 1: Chronic Adipose Inflammation



Path 2: Cellular Senescence Shift



Path 3: Gut-Adipose Crosstalk

# Candidate Research Targets

- ✓ **Modulate 11 $\beta$ -HSD1:** Dampen localized cortisol signaling in visceral tissue to restore healthy metabolism.
- ✓ **Improve Gut Barrier:** Reduce systemic endotoxin influx that triggers abdominal inflammation.
- ✓ **Target Senescence:** Utilize senolytics to clear dysfunctional "zombie cells" from aging adipose tissue.
- ✓ **Mitochondrial Support:** Rejuvenate cellular energy production to prevent lipid peroxidation and fibrosis.

# Roadmap: FATLAS-002

## Tissue Analysis

Comparative omics of visceral vs. subcutaneous depots.

## Pathway ID

Identifying key signal divergence points in cells.

## Validation

In-silico testing of therapeutic control points.

## Translation

Drafting clinical strategies for metabolic health.

# Precision Metabolic Health

Mapping the future of metabolic medicine through AI-integrated biological signals and localized targeting.

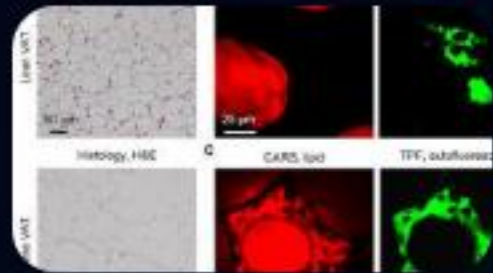
# Connect & Collaborate

Join the open-initiative research into adipose signaling.

 DavidFliesen/FATLAS

Exploring the Frontiers of AI-Assisted Biomedicine

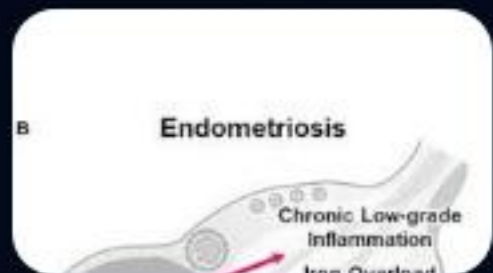
# Image Sources



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